3. (Amended) The method of manufacturing thin film transistors according to claim 2, wherein said ion implanting steps (b) and (c) are carried out with acceleration energy in a range of 10keV to 30keV.

5. (Amended) The method of manufacturing thin film transistors according to claim 1, wherein said step (a) further comprises substeps of:

(a-1) depositing an amorphous semiconductor layer on said substrate; and

(a-2) irradiating a laser beam on said amorphous semiconductor layer, to change said amorphous semiconductor layer into a crystalline semiconductor layer.

REMARKS

As a preliminary matter, Applicant respectfully requests that the Examiner consider the references cited in the Information Disclosure Statement accompanying this Amendment and list these references of record in the Application.

As a second preliminary matter, claim 5 has been amended to correct a typographical error in the recited language. No new matter has been introduced by the correction of this error.

Claims 1-4 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hodate et al. (U.S. 5,518,940), taken with Yudasaka et al. (U.S. 5,563,427). Applicant respectfully traverses this rejection because neither of the cited references, whether taken

alone or in combination, discloses or suggests that hydrogen ions are implanted into both the lightly and heavily doped regions, but not in the channel region under the gate electrode, as recited by claim 1 of the present invention, as amended.

Hodate discloses a method of manufacturing a thin film transistor wherein phosphorous ions are implanted into regions of the thin film. (See col. 12, lines 28, 46). However, Hodate neither discloses nor suggests that hydrogen ions are implanted in any region of the thin film.

Yudasaka, on the other hand, does disclose a method where hydrogen ions are implanted, in addition to phosphorous ions, into regions of the thin film. However, Yudasaka also discloses that hydrogen is implanted into the channel region 607, in addition to the other implanted regions of varying concentrations. (See FIGS. 22A-D, 31A-D, and corresponding descriptions). Yudasaka does not prevent hydrogen implantation into the channel region.

In contrast, claim 1 of the present invention as amended recites, among other things, that the ion implanting steps are so selected that hydrogen ions are implanted in both the lightly and heavily doped regions, but not into the channel region under the gate electrode. Hodate does not even suggest the implantation of hydrogen. Yudasaka teaches away from excluding hydrogen from the channel region.

An obviousness rejection based on a combination of prior art references is improper if one of the cited references teaches away from present invention. Yudasaka teaches that hydrogen ions are implanted in the channel region below the gate electrode,

whereas hydrogen is excluded from the channel region in the present invention. The proposed combination is therefore improper. Hodate is silent regarding the implantation of hydrogen. Accordingly, the rejection of claim 1 based on a combination of Hodate and Yudasaka is respectfully traversed.

Claims 2-4 all depend either directly or indirectly from independent claim 1, and therefore include all of the features of the base claim, plus additional features. Accordingly, for at least the reasons discussed above in traversing the rejection of claim 1, the rejection of claims 2-4 based on a combination of Hodate and Yudasaka is respectfully traversed.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hodate with Yudasaka, and further in view of Yamazaki et al. (U.S. 5,523,257). Applicant respectfully traverses this rejection for at least the reasons cited above in traversing the rejection of independent claim 1. Claims 5 and 6 both depend either directly or indirectly from claim 1. Moreover, Applicant traverses the rejection because none of the cited references, whether taken alone or in combination, discloses or suggests that hydrogen ions are implanted into both the lightly and heavily doped regions, but not in the channel region.

As discussed above, neither Hodate nor Yudasaka disclose or suggest that hydrogen is implanted in the lightly and heavily doped regions, but excluded from the channel region. Hodate does not suggest the implantation of hydrogen, and Yudasaka teaches away from excluding hydrogen from the channel region.

Yamazaki merely discloses the use of laser annealing for re-crystallization and activation. However, Yamazaki neither discloses nor suggests the implantation of hydrogen, nor that hydrogen would be implanted in some regions, but excluded from the channel region (the area between the boundaries designated by "X" throughout Yamazaki). Accordingly, for at least these additional reasons, the rejection of claims 5 and 6 based on a combination of Hodate, Yudasaka, and Yamazaki is respectfully traversed.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned "**Version with markings to show changes made.**"

For the foregoing reasons, Applicant submits that this Application, including claims 1-6, is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 1, 3, and 5 have been amended as follows:

1. (Amended) A method of manufacturing thin film transistors comprising the steps of:

(a) forming a plurality of island-shaped semiconductor layers on a substrate having an insulative surface;

(i) forming a gate insulating film on each of the semiconductor layers;

(ii) forming a gate electrode on the gate insulating film over each of said semiconductor layers;

(b) implanting dopant into first regions at outsides of a region designated for a channel region under said gate electrode in each of said semiconductor layers directly or through a thin insulation film whose thickness is equal to or less than 50nm by ion implantation to form lightly doped regions; and

(c) implanting dopant into outer regions [at outsides of] within said first regions in each of said semiconductor layers directly or through said thin insulation film to form heavily doped source/drain regions whose impurity concentration is higher than that of said lightly doped regions[.];

wherein said ion implanting steps (b) and (c) are so selected that hydrogen ions are also implanted into said lightly doped regions and said heavily doped source/drain regions, but not into said channel region under said gate electrode.

3. (Amended) The method of manufacturing [the] thin film transistors according to claim 2, wherein said ion implanting steps (b) and (c) are carried out with acceleration energy [equal to or less than 30 keV] in a range of 10keV to 30keV.

5. (Amended) The method of manufacturing [the] thin film transistors according to claim 1, wherein said step (a) further comprises [the] substeps of:

(a-1) depositing an amorphous semiconductor layer on said substrate; and

(a-2) irradiating a [layer] laser beam on said amorphous semiconductor layer, to change said amorphous semiconductor layer into a crystalline semiconductor layer.